

MARKED-UP VERSION OF SUBSTITUTE SPECIFICATION
U.S. Patent Application 10/549,422

MODULAR POOL CONSTRUCTIVE DESIGN

Title of the Invention

Modular Pool Constructive Design

5 Field of the invention

The present invention refers to the construction of ~~pool~~ pools and, more specifically, to pools made up of ~~standardised dimension~~ metallic modules of standardized dimensions.

10 Background of the state of the art

The growing popularity of pools for recreational, therapeutic and domestic use has resulted in the creation of a plurality of types and models, intended to meet the ~~market's~~ market's large variety of expectations. Among others, the ~~following can be mentioned as the~~ most widely ~~spread~~ known are the following:

- concrete pools, lined with tiles, miniature tiles or vinyl linings; ~~fibreglass~~
- fiberglass pools, manufactured according to ~~standardised~~ used dimensions and shapes;
- ~~mixed~~ type pools, with a concrete base (bottom) and walls made of blocks, clay bricks or metallic sheets, usually waterproofed with vinyl lining or ~~fibreglass~~ fiberglass skin.

25 However, constructing pools of the above mentioned types is a relatively complex, slow and expensive process, since, in addition to requiring ~~specialised labour~~ specialized labor, they have disadvantages inherent to their nature.

 In fact, it is known that concrete structures require the manufacture of ~~moulds~~ molds that, once used, are disposed of, resulting in a substantial waste of material.

30 ~~The fibreglass~~ Fiberglass pools, although ~~they do not have this inconvenience, they~~ not having this shortcoming, require digging

a hole in the ground with the proper dimensions, as well as the provision of a concrete support bottom.

Additionally, ~~both~~neither concrete ~~and fiberglass~~nor fiberglass pools can~~not~~ be moved to another location, ~~and~~nor can they have their dimensions ~~(length, width, shape, depth)~~ altered, ~~having~~leaving no choice for their owners but to live with the original dimensions forever. ~~In the case of~~For instance, in a pool built ~~at a certain time~~ for small children ~~to use, for example,~~ it ~~is~~becomes impossible to increase ~~the~~its depth when these children grow ~~up.~~

Conventional pools have ~~even~~—other ~~inconveniences~~shortcomings, such as the need ~~of~~for special techniques to install underwater lighting (~~that~~which must be planned ~~during~~before the construction), ~~not being possible to alter the number or position of the lights once the construction has ended.~~ begins), as well as the impossibility of altering the number or positions of these lighting fixtures after the construction is finished.

The above—m—entioned inconveniences have ~~resulted~~in led to the search ~~of~~for solutions based on modular techniques, in order to ~~make their costs~~result in more accessible costs, as well as ~~reducing~~to reduce assembly time and ~~making it easier.~~ That to facilitate said assembly work. This trend is exemplified by ~~the~~ patent documents US 3798857 to Barrera (hereinafter “Barrera”), US 3820174 ~~and~~to Rozanski (hereinafter “Rozanski”), US 4047340, ~~which describe techniques based on the use of standardised modules.~~ to Witte et al (hereinafter Witte) and DE 1264031 to Dr. Theodor Kootz (hereinafter “Kootz”).

~~However, the~~ The inventions described in the above—mentioned documents ~~have inconveniences,~~ however, have shortcomings that limit their usefulness, as ~~is shown~~discussed below. ~~The document US 3798857 describes a pool which walls are made up by~~ Barrera discloses a pool whose walls consist of modules made of steel sheets—modules, equipped with ~~couplings~~coupling means between the

vertical ~~borders~~edges of ~~the~~ adjacent modules, whose assembly results in the ~~pool's sidewall, according to Fig.~~pool's side walls, as shown in Fig. 1. Nevertheless, ~~the illustrated~~Said coupling means comprise rectangular slots into which tabs are inserted, the retention between modules being provided by locking pins. The shapes of these tabs require expensive manufacturing processes. Moreover, as shown in Fig. 1, the pool has to be ~~embedded~~placed inside a hole dug into the ground, therefore, requiring ~~as occurs with fibreglass pools the digging of a hole for its construction.~~

In addition, the ~~invention does~~modules of Barrera do not ~~take into account~~apply to the bottom of the pool, which is made of concrete and requires specialized ~~and, therefore,~~as well as costly ~~labour. The same labour is~~labor, which is also needed ~~too~~to manufacture the concrete blocks that provide support to the ~~walls'~~walls' anchor beams. ~~As well as that inconvenience, the execution time is long, because of the time necessary for the concrete to harden.~~

~~The document US 3820174 describes~~Rozanski discloses a pool whose walls are made ~~up by~~of steel sheet modules, complemented by a ~~trellised~~three-dimensional lattice structure, as is shown in Figs. 2 and 3. The objective of this ~~invention~~is to provide a ~~structural array~~supporting structure for ~~assembling~~the ladder'sladder's handrails, as well as ~~the support of~~supporting a concrete deck or pavement surrounding the edge of the pool. As in the previous example, the bottom of the pool requires specialized ~~labour,~~labor, which is also necessary to lay the concrete pavement, ~~these.~~These operations ~~that involve~~are time consuming, due to the ~~delay necessary~~time needed for the concrete to harden.

~~Patent US 4047340 describes~~Witte discloses a pool ~~which~~with walls ~~are~~are made up ~~by~~of modular plate--shaped elements that have, in their vertical ~~borders, groove~~edges, grove and tongue joints, ~~those plates being.~~The horizontal forces are supported by ~~horizontal thrust provided by "X"~~--shaped pre-moulded

~~parts~~ fabricated elements, as shown in ~~figures~~ Figs. 4 and 5. ~~The~~
array ~~As shown requires the use of~~ in Fig. 5, a concrete bottom
(~~referenced as 90 in figure 5~~) must be provided to support the wall
modules 32, ~~on which they lean~~, as well as the ~~module~~ internal
5 ~~borders~~ edge of the deck 20. ~~The distal end of the latter is supported by~~ that
surrounds the pool. The external edges of said deck rests upon
one of the arms 50 of the "X"-shaped ~~part, which~~ elements, whose
bottom arm 50d ~~leans~~ rests on a metallic ~~bracket~~ footing 80 that is
secured to the ground or - according ~~to the document Witte -~~ a
10 concrete base, not shown in the ~~figure, this~~ drawing. Said base is
necessary due to the fact that the ~~stress, thrust~~ resulting from
the ~~water's thrust~~ water's pressure upon the walls, ~~are~~ is also
unloaded on ~~to this bracket~~ footing. In the ~~object~~ subject matter
of this patent, the same considerations regarding the delay
15 ~~introduced~~ in the ~~time of~~ construction ~~due to the~~ time necessary for the
~~concrete to harden~~, are also applicable.

~~The three examples of the state of the arte described above also suffer common inconveniences, of which one of the most evident consists of the fact that the pools have fixed depths, since the walls are constituted by predefined size modules. Another serious inconvenience of these models is in the possibility of the occurrence of structural damages in the case of differential pressure of the ground on which the pool lies.~~

~~In fact, in the objects described in the documents US 3798857 and US 4047340, any deformation of the ground, on which the brackets or concrete blocks lie, will result in the deformation of the pool walls. Additionally, the differential pressure on the soil on which the bottom lies will produce stress that could result in the appearance of cracks with probable fissures lining and consequent infiltrations that speed up the wear and tear process of the pools.~~

Objectives Kootz teaches a swimming pool having its
bottom, as well as its sides, formed of metallic tray-like
modules that are bolted together. The pool has two parts with
different depths: in the shallower part, the walls are
30 composed of a single row of panels, whereas in the deeper
portion, the walls are higher, being formed of two superposed
rows of panels. In the bottom of the pool, the tray-like
panels are placed with their flanges facing up (i.e., the
inside of the pool). This configuration is necessary due to
35 the fact that said panels must be bolted together to form the
bottom. However, to attain a uniform bottom surface, the trays

must be filled with concrete covered with a fiberglass layer.
Therefore, the pool cannot be disassembled, as the bolts which
join said bottom panels are be encased in concrete. Moreover,
said bottom panels have to be laid on a leveled surface,
5 preferably, one that has been compacted or overlaid with a
layer of concrete. Additionally, the horizontal thrust upon
the side panels, due to the water pressure, may result in the
outward bending of the walls of said deeper portion, mainly
along the joints between the upper and lower rows of panels.
10 This sets a limit to the number of panels that can be
superposed to increase the height of said side walls and,
therefore, the pool's depth.

The above-mentioned examples of the state of the
art suffer from serious shortcomings due to the possibility of
15 structural damages due non-uniform resistance from the ground
on which the pool lies. Such is particularly the case with the
objects of Barrera and Witte.

Objects of the invention

20 ~~Due to~~ In view of the above, ~~the~~ a first objective
of the invention is to provide a ~~constructive design that results in a pool in~~
~~which the effects of~~ modular pool that is not affected by
irregularities ~~in~~ of the ~~soil~~ soil's compression ~~strength~~ resistance.

25 ~~A second objective is to provide a building method that allows an easy and fast assembly of pools whenever possible disposing of specialized labour.~~

~~Another objective is to provide a constructive design that allows the easy disassembly and reassembly of the pool.~~

30 Another object is to provide a modular pool
adapted to be easily and quickly assembled, without recourse
to specialized labor.

Another object is to provide a modular pool
adapted to be easily assembled and disassembled.

Yet another objective ~~ive~~ is to provide a ~~constructive~~
~~design that~~ modular pool whose construction does not require the
35 use of concrete walls or bottom, blocks or bricks.

Yet another objective is to provide a ~~constructive design that includes the structure~~ modular pool that allows the inclusion of a deck.

Another additional objective is to provide a
5 ~~constructive design~~ modular pool that ~~allows~~ can be easily ~~altering the pool's~~ changed in dimensions and shape.

Another objective is to provide a ~~constructive design that allows assembling the~~ modular pool both under and adapted to be assembled either below or above the ground level.

10 ~~Brief description~~ Summary of the invention

The above--mentioned ~~objectives~~ objects, as well as others, are attained by the present invention through a ~~constructive design~~ modular pool in which the ~~modules that constitute the bottom and~~ edges of the metallic modules that form the walls
15 are ~~interlinked~~ attached by semi-permanent ~~connecting~~ attaching means ~~in order to make up a unique and non-deformable structure.~~ latticed base structure composed of a plurality of metallic sleepers placed crosswise at right angles to a plurality of parallel metallic beams running lengthwise, said metallic sleepers and said
20 beams being "U" section shaped with the central portion being vertically oriented.

According to another feature of the invention, said modules are manufactured of steel sheets, which bestows them lightness, portability and easy assembly. According to additional feature of the invention, the
25 ~~modules that make up the walls are manufactured of different standardised heights, all having the same horizontal dimension, making it possible to obtain several depths by piling the proper modules.~~

According to yet another feature of the invention, the pool's internal lining is of Vinyl, applied once the pool's structure assembly has been finished.

~~According to another feature of the invention, the pool's bottom is comprised by a base structure covered by closing modular panels.~~

30 In accordance with an additional feature of the invention, the metallic modules that form the walls are made from sheet metal comprising a rectangular shaped center portion provided with flanges along the vertical and horizontal edges of said central portion.

According to another feature of the invention,
said flanges are bent at a right angle relation to said
central portion.

In accordance with an additional feature of the
5 invention, said semi-permanent attaching means comprise angle
irons having their vertical flange attached to the vertical
central portion of said sleepers and beams, and their
horizontal flange attached to the bottom flanges of the
metallic modules that form the bottom tier of the pool's side
10 walls.

According to another feature of the invention, the ~~deck is comprised~~
~~by standardised elements and is part~~ bottom of the ~~structure.~~

~~According to another feature of the invention, the pool's assembly disposing the use of soldering or~~
15 ~~concreting, all of its components being joined to one another by means of standardised dimensions screws~~
~~and nuts.~~

~~According to another feature of the invention, the set of modules~~ pool
comprises ~~modules with opening for underwater light fittings, proper modules for~~
~~skimmer and modules for bottom drain.~~ a plurality of modular bottom
panels placed crosswise to the above-mentioned sleepers with
20 their end portions being supported by the horizontal upper
flange of said sleepers.

~~Description~~ According to another feature of the
invention, said modular bottom panels comprise modules
provided with bottom draining openings.

25 According to yet another feature of the invention,
said sleepers, beams and modular wall panels as well as said
angle irons are joined by nuts and bolts.

Brief description of the drawings

30 ~~The other~~ Additional advantages and features of the
invention will be ~~easier~~ better understood through the
description of a preferred embodiment and ~~of~~ the accompanying
drawings ~~that refer to it~~, in which:

Figures 1, 2, 3, 4 and 5 show pools built
35 according to the ~~known~~ previous art.

Figure 6 ~~shows, through a~~ is a general perspective view, of the structure's aspect of a pool built according to the principles of the invention.

~~Figure~~ Figures 7 shows, by means of top views, , 8, 9 and 10
5 show side views of various combinations of side-modular side
wall panels—corresponding to—, providing different depth pools.—pool
depths.

~~Figure 8 shows the manufacturing of a typical panel, according to the principles of the invention.~~

10 ~~Figure 9 shows, by means of a perspective view, details of the assembly of the panels that make up the wall in one of the pool's corners.~~

~~Figure 10 shows, by means of a perspective view, the features of the wall panels in a corner with an angle that is not of 90°.~~

~~Figure 11 shows, through a blown up view, the elements that comprised the pool's bottom structure, according to the principles of the invention.~~

15 Figure 11 shows a typical wall panel before
folding of the flanges.

Figure 12 shows the wall panel of the previous
drawing, with the flanges folded and strengthening it in order
to resist the water pressure.

20 Figure 13 shows, by means of a top view, a corner
where the side walls meet at an angle different from 90°.

Figure 14 shows an exploded view of the assembly
of the side walls of a pool.

Figure 15 shows, by means of a partially exploded
25 view, the assembly of sleepers and beams that comprise the
latticed base structure of the pool.

Fig. 16 shows, by means of a perspective view,
part of the pool's bottom assembled base structure once assembled.—of
the pool and the positions of the angle irons, as well as the
30 panels that form the bottom of the pool.

~~Figure 13~~ 17 shows, by means of a cross—section
view, the joint of formed by the side panels with the bottom's structure,
according to the principles of the pool, an angle iron and a sleeper.

Detailed description of the invention:-

~~Detailed Description of the Invention~~

~~Now, referring in more detail~~Referring now to Fig. 6, which shows a pool ~~exemplifying~~¹⁰ built according to the invention, ~~not limiting it,~~ can be seen that said pool comprises ~~the pool 10, with rectangular shape and uniform depth,~~ two ~~side~~^{side} walls 11 and 12, two head ~~ends~~^{walls} 13, and 14 as well as ~~the a~~ bottom 15, all these ~~elements being constituted by parts consisting of~~ constructive modular panels, as ~~described~~^{detailed} below.

¹⁰ Since in the example embodiment described the pool has a standard depth of 1 meter, the sides 11,12 and the head ends 13,14 are comprised by panels 17 overlaid on panels 18 that, in turn, are overlaid on panels 19. All these panels have the same length, corresponding to a standard module, which can have any convenient measurement, in the present embodiment the value of 1 meter is being adopted.

¹⁵ Panels 17 have a useful height of 500 mm, panels 18 the height of 300 mm and panels 19, 200 mm. Adding these heights the total depth of 1 meter is obtained. ~~The total height of panels 17 is 630 mm, in~~ Considering that the exemplary embodiment shown in Fig. 6 has a standard depth of 1 meter, said side walls and said end walls are formed by three tiers of panels, all having the same standard length, such as, for ²⁰ example, one meter. Upper panels 17 have a useful height of 500 millimeters, intermediate panels 18 are 300 millimeters high and bottom panels 19 are 200 millimeters high. In order to leave a clearance of 130 ~~mm~~^{millimeters} between the water surface and the ~~pool's border.~~ pool's upper edge, panels 17 are 630 ²⁵ millimeters high overall.

~~Yet~~^{Still} according to ~~figure~~^{Fig.} 6, the ~~pool's~~^{pool's} bottom ~~15~~^{surface} is made up by panels 16, hereinafter called "tiles", which completely line the ~~bottom's~~^{bottom's} surface, and ~~that~~ are supported by ~~a~~^{the} latticed base (not shown in ~~the figure~~) comprised by an array of standardised dimension, modular, crossed beams. this drawing).

Additionally, ~~according to the principles of the invention, all the pool's components~~^{all said pools component parts} have dimensions that allow ~~loading them to~~

be loaded in pick-ups or small trucks, ~~offering easy and~~ for low cost transport.

~~In the example~~ation. So, in the exemplary embodiment herein described, the ~~dimension of the~~ largest part, ~~corresponding to~~ are the beams ~~of the base of the bottom, is~~ that comprise the lengthwise beams, which are only 2 meters long. This allows them to be transported in ~~buildings' elevators~~; building's elevators, substantially reducing vertical ~~transport~~ transportation costs to assemble for pools assembled in penthouses.

Figure 7 shows some example assortments of different height side panels that allow building pools with various depths. In drawing 7a, the Figures 7 to 10 depict some exemplary arrangements of side panels of different heights, showing how the invention allows the construction of pools with various depths. Fig. 7 shows how a depth of 1 meter is ~~obtained~~ attained by ~~overlaying a~~ the superposition of panel 17, with a useful height of 500 mm, a 500mm, panel 18, 300 mm high with a height of 300mm and a panel 19, which is 200-mm high.

In ~~drawing 7b, the~~ Fig. 8, a depth of 1.2 meter results from ~~overlaying~~ meters is attained by superposing a 500mm panel 17 ~~of 500 mm~~, a 400mm panel 21 ~~with 400 mm high~~ and a 300mm panel 18. A depth of ~~300 mm~~. 1.3 meters results from the superposition of one panel 17, two 300mm panels 18 and at the bottom one 200mm panel 19, as shown in Fig. 9. Finally, Fig. 10 exemplifies a 1.5 meter depth attained by overlaying one panel 17, one panel 21 and three panels 19, having heights of 500mm, 400mm and 200mm, respectively.

Figure 7c shows a depth of 1.3 meter obtained by overlaying a panel 17, two panels 18 and a panel 19, whilst in figure 7d the depth of 1.5 meter results from overlaying a panel 17 (500 mm), a panel 21 (400 mm) and three panels 19 (200 mm each).

A general rule adopted to build the pool's walls is using higher panels next to the surface, adopting progressively shorter panels at greater depth.

As a general rule, the larger panels should be placed closer to the surface, progressively narrower panels being used at greater depths, so that the panels having smaller height (such as panels 19) are placed next to the floor. It is also noted, ~~in the present embodiment,~~ that the height of in

the present exemplary embodiment panel 17 ~~is~~ has a height greater than 500-mm, the excess ~~21 corresponds~~²⁴ corresponding to the clearance between the water's surface 23 and the top ~~of said panel~~²² of the pool's side walls.

5 ~~The drawings of figure 8 show, in details, how a pool's panel~~^{Fig. 11} shows how a panel 30 is formed from a rectangular metallic sheet~~30~~. As ~~figure 8a shows, the developed~~^{shown}, this sheet comprises a rectangular central portion 31 ~~having~~^{whose} sides are contiguous with stripes 32, 33, 34, 35~~contiguous to the sides of, the~~ boundaries between said ~~rectangle, and separated from the latter by~~^{central} portion and said stripes being the folding lines 31a~~....~~, 31b, 31c, 31d. ~~These~~^{Said} stripes have ~~a standardised~~^{the same} width and through~~—~~holes 36, ~~all of the same diameter and located~~^{placed} at ~~predefined~~^{standardized} positions ~~according to the standard adopted~~. Once these

10 ~~rims have been,~~ and are folded in the ~~direction indicated by the~~ directions shown by arrows 37, ~~the panel acquires the aspect shown in figure 8b, where the rectangular central portion 31 will make up the pool's sidewall. The hydrostatic pressure 38 is applied on this central portion 31, producing horizontal and vertical bending stresses. The horizontal rims 32 and 34, which act as a beam's vanes,~~

15 ~~absorb the former.~~

20

The vertical rims 33 and 35 provide the necessary rigidity against the bending stresses on the vertical plan. In addition to the structural role, the said rims provide connecting means with the rest of the wall's adjacent panels.

25 ~~Figure 9 shows a~~^{Fig. 12} depicts the same panel after folding along said lines 31a, 31b, 31c, 31d, where it can be seen that the horizontal and vertical stripes act as flanges which absorb the bending stresses due to the water pressure 38 acting upon the central portion 31. Additionally, the through-holes in said stripes are used to connect adjacent panels to

30 form the pool's side walls.

The general layout of the elements that ~~constitute~~^{form} part of the ~~walls; and wall as well as a pool's rectangular corner, formed by the meeting of said walls at 90 degrees.~~ are shown in Fig. 14. The first side wall that comprises sets 40, 41 and 42, each one ~~of which~~^{being} formed by

5 ~~piling the superposition of modules 17, 18 and 19. According to the invention, the~~ As shown in this drawing, said vertically adjacent modules are joined through the screw-nut elements 44-45, which traverse the through-holes 35 in the juxtaposed horizontal rims, for example in the present case, rim 34 of module 17 with rim 32 of module 18. Horizontally, the same type modules are joined, i. e., module 17 of set 41 with module 17 of set 42, and so on, the same elements 44-45 providing the permanent joint between said modules.

10 Figure 9 also shows how the joint in a right angle between the first set 43 of the second wall and the first wall of the pool, is structured. According to this figure, rims 33 and 35 of the same type modules make an angle α between them, which, in the present example embodiment, is equal to 90°. The connection between these elements is provided by angle iron 46, which rims also make an angle $\alpha = 90^\circ$ and whose drilling coincides with the holes of said rims. The same screw-nut elements 44-45 are used to provide the connection of said elements.

15 It is important to point out that the layout shown is not limited to right angles, the angle between the walls can have different measurements to 90°, such as for example 120°, for hexagonally shaped pools. In this case, the side rims 33' and 35' turned towards the corner between walls will be folded at angles different to 90°, since it is convenient maintain the right angle between the rims of angle iron 46, in order to preserve the necessary rigidity of the structure. In the present example, the said angles are equal to a 75°, as figure 10 shows.

20 The pool's floor is constituted by a support structure on which the closing panels, called "tiles", are placed. The structure is comprised by rectangular grid formed longitudinally by the sleepers, having crossbeams placed between them; all these elements are modularly dimensioned de forma modular. Figure 11 shows, by means of a blown up view, the elements that make up said support structure, comprising: sleepers 51, formed by one or more intermediary modular beams 52 at the central portion, having at both ends the point modular beams 53; scarves 54 to connect said beams, by way of top joints, formed by short "U" section beams, dimensioned in order to fit in the modular beams; modular crossbeams 56 placed between said sleepers by means of angle irons 55.

30 ~~Screwsbolts 44 and nuts 44-45 (not shown in this figure), of the same type and dimensions used in assembling the walls, connect said structural elements to each other.~~ The same nut-bolt elements are used to join the vertical flanges of said sets.

35 ~~Figure 12 shows part of the structure assembled on the pool's floor~~ The drawing in Fig. 14 is exploded horizontally to show a vertical member 65 which is interposed and bolted between adjacent assemblies 40 and 41 (formed by panels 17, 18 and 19 vertically joined). This member 65 consists of a plate that may have the same width as the vertical flanges of said modular panels, and its height encompasses the total height of said assemblies. Said plate acts as a reinforcing member that resists the outward stresses acting upon the side walls, which tend to push outwardly central panels 18. Lengthwise reinforcement at the top of the pool's wall is provided by a metal plate 64 whose through-holes 36' are coincident with the through-holes of the upper flanges of the upper panels. Said

metal plate 64 may be used to support a deck floor along the walls.

Fig. 14 also depicts a right-angle joint between two side walls of the pool. As shown, the vertical flanges of the identical modules at the free ends of assemblies 42 and 43 are bolted to the flanges of an angle iron 46, which is provided with through-holes in positions coincident with the holes of said flanges.

It should be stressed that the pool's layout is not limited to right angles $\alpha = 90^\circ$ as shown in Fig. 14. For instance, an angle of $\alpha = 120^\circ$ for hexagonal shaped pools is shown in Fig. 13. In this case, side flanges 35' adjacent to said angle iron 46 are folded at angles of 75° in relation to the central part of panels 17'. The corresponding upper and lower flanges of the panels 17' have also been cut in accordance with this angle.

The floor of the pool comprises a supporting structure upon which the closing panels or "tiles" are placed. As depicted in Fig. 15, said base structure consists of a rectangular lattice comprising a plurality of parallel metallic U-shaped beams 51 having metallic U-shaped sleepers 56 placed crosswise between them. In a preferred embodiment, said beams and said sleepers may have the same height. As shown, beams 51 are composed of several modular elements 52 (in the central part of the beams) and 53 (at the ends of the beams) butt-joined with side-plates 54. Sleepers 56 are attached to said beams by means of L-shaped plates 55. Standardized bolts and nuts (not shown) of the same type of the ones used for side wall assembly are used throughout.

Fig. 16 depicts part of the assembled pool's base structure, forming a rectangular lattice or grid with ~~the same pitch as~~ module m. This grid supports the ~~floor's smooth~~ pool's floor tiles 57, ~~which lean on beams 56~~ 58, whose ends rest upon the upper flanges of sleepers 56. As shown in ~~figure~~ the drawing, said tiles ~~have side rims~~ are not bolted to their supporting members,

and comprise flanges 57a ~~that act as vanes~~ along the greater part of their long sides, said flanges providing the necessary rigidity to resist the ~~bending resulting from the hydrostatic~~ vertical thrust due to the water pressure upon the bottom. In addition to the ~~smooth~~ regular tiles 57, special tiles are provided for various specific functions, such as tile 58 that has a central opening 59 to ~~assemble the bottom's drain.~~ receive the bottom's draining valve assembly.

Figure 12. 16 also shows the angle irons 61 that constitute the side panel assembling elements, providing ~~comprise~~ the necessary link semi-permanent attaching means between the ~~pool's~~ side walls and bottom. ~~These~~ the base structure. Said angle irons 61 have through holes 62a on their vertical rims, ~~co-operatively aligned~~ flanges, placed in coincident positions with holes 62b ~~located~~ on the base structure perimeter beams (crossbeams and sleepers) as well as on the beams, to which they are attached by means of ~~screws~~ bolts 44 and nuts 45. The horizontal flanges of said angle irons are provided with through holes 63, which are coincident with holes 36 on the lower flange of the wall panels. According to the cross-section view of Fig. 17, the bottom flanges of the panels of the lower tier 19 of the side walls are bolted to the horizontal flanges of said angle irons 61, which have their vertical flanges bolted to the perimeter beams such as sleepers 56 of the base structure, allowing the horizontal stresses upon said side walls to be unloaded on the base structure.

According to the schematic cross section view of figure 13, the wall lower, such as, for example, panels 19, are attached to the horizontal rims of said angle bars, by means of screw nut sets 44-45 and through holes 63, resulting in the formation of a unique block by said link. Consequently, the horizontal stress applied to said panels by the hydrostatic pressure are unloaded on the floor's structure.

Although the ~~above~~ preceding description ~~referred~~ refers to swimming pools, the ~~constructive features of the~~ invention ~~offer~~ has a ~~wide~~ wider range of applications. ~~One of these~~ refers to the building of such as iced water reservoirs for air conditioning systems ~~in~~ retrofitted into existing buildings;

~~without requiring civil works or structural alterations.~~ In ~~fact~~this case, the
~~invention allows assembling a~~ reservoir ~~on~~can be placed over existing
floors, ~~for example~~such as in garages or ~~patios~~courtyards, thermal
~~isolation~~insulation being provided by polyurethane or
5 ~~polystirene~~polystyrene sheets ~~interlaid~~inserted between the walls ~~and~~
~~bottom~~and the bottom and the inner vinyl lining. ~~of the~~
reservoir.

~~Therefore, it is understood that modifications can be introduced by~~
~~technicians in the subject, keeping~~Therefore, the object above described
10 may be modified within the conceptual limits of the invention,
~~the latter~~being only limited by the list following set of claims
below.